2 HANFORD SITE ENVIRONMENTAL MANAGEMENT MISSION AND SITE DESCRIPTION

2.1 HANFORD SITE VISION

The Hanford Site has dealt with legacy wastes, and has become a national environmental science and technology asset performing new missions.

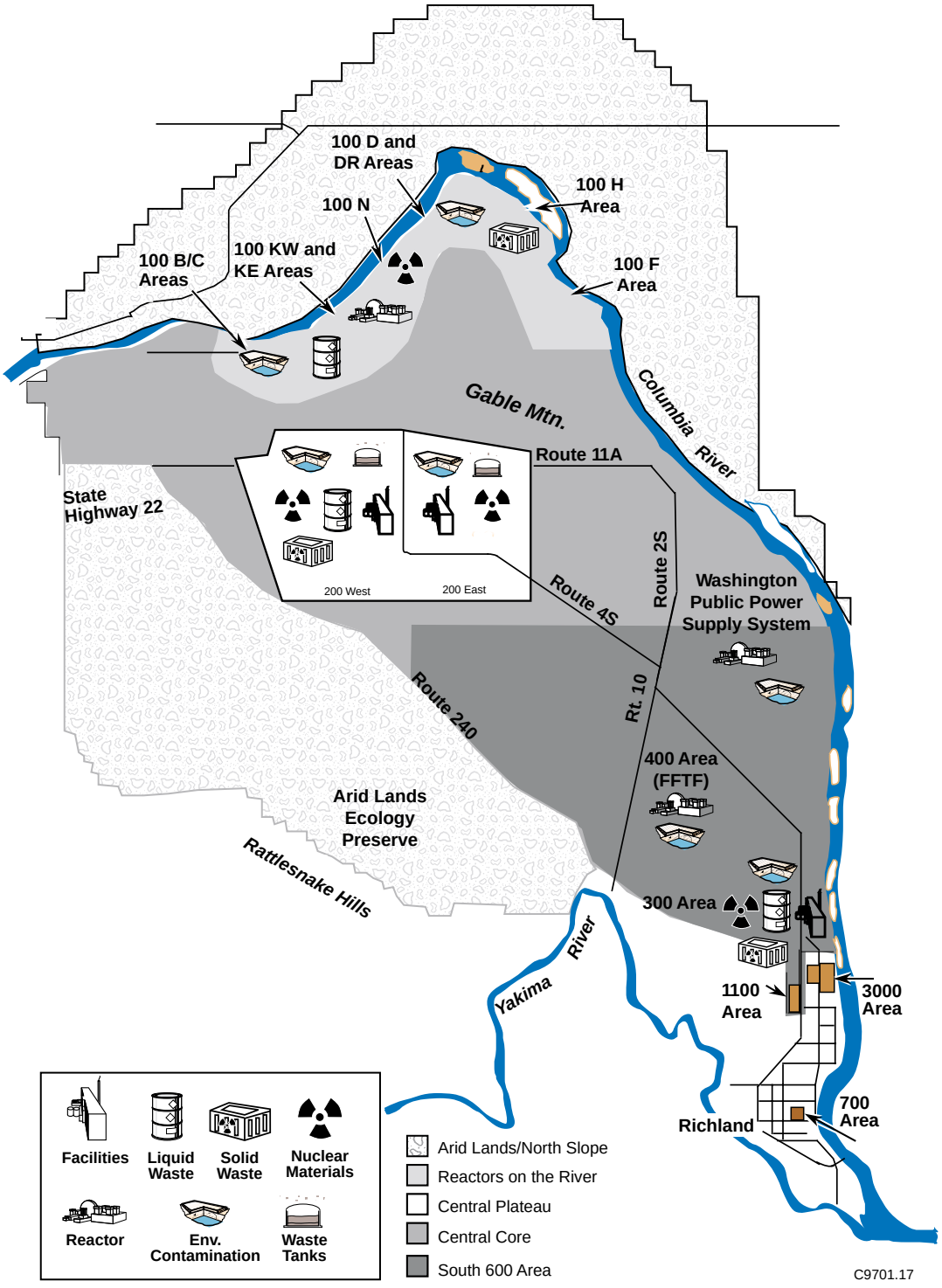
2.2 HANFORD SITE ENVIRONMENTAL MANAGEMENT MISSIONS

Hanford Site missions are to safely clean up and manage the Site's legacy wastes and to develop and deploy science and technology. Through these missions, the Site contributes to economic diversification of the region.

2.3 GEOGRAPHIC AREAS, REQUIREMENTS, AND PLANNING ASSUMPTIONS

The Hanford Site is comprised of four major geographic regions (see Figure 2-1). This section describes the requirements and planning assumptions for land-use for these geographic regions.

Figure 2-1 Hanford Site



2.3.1 Reactors on the River

The Reactors on the River Area is approximately 30 square miles and is bordered by the Columbia River. It was used primarily for defense production reactors. There are nine reactors, designated B, C, D, DR, F, H, KE, KW, and N, and their associated support facilities in this area. The locations of the nine reactors along the Columbia River are illustrated in Figure 2-1. Solid waste from reactor operations was buried in 28 burial sites from 1944 through 1973. Liquid waste from Reactor Operations was discharged directly to the environment. Currently, N Reactor fuel is stored underwater in the KE and KW Basins. Radiological and chemical contaminants have reached the groundwater and the Columbia River from operations in this area.

- Pending Congressional action on the Wild and Scenic River designation, use will continue to be restricted; sensitive ecological, cultural, and native American resources will be protected.
- Remove and/or stabilize spent fuel, surplus facilities, and waste sites to protect groundwater and the Columbia River and to ensure protection of people, the environment, and natural/cultural resources. Pending Congressional action on the Wild and Scenic River designation, use will continue to be restricted; sensitive ecological , cultural, and native American resources will be protected.

2.3.2 Central Plateau

The Central Plateau Area is approximately 30 square miles in the middle of the Hanford Site. There are five fuel reprocessing facilities and associated support buildings. There are 149 single-shell tanks and 28 double-shell tanks storing a total of 212,000 cubic meters of waste. There are 34 active and retired solid waste burial grounds in this area. Liquid effluent was discharged directly to the soil column and, as a result, contaminants have reached the groundwater.

- The 200 Areas and central plateau will be used for the management of nuclear materials and the collection and disposal of waste materials that remain onsite and for other related and compatible uses. Cleanup levels and disposal standards will be established that are consistent with these long-term uses.

2.3.3 South 600 Area

The South 600 Area includes the 300 Area, 400 Area, and 1100 Area. The 1100 area has been turned over to the Port of Benton. The 300 Area is approximately one square mile bordered by the Columbia River and is close to Richland, Washington. This area was used for fuel fabrication in support of the reactors and as a science and technology center in support of Site operations. There are several contaminated facilities and soil sites in the 300 Area. The groundwater is also contaminated. The 400 Area is approximately one square mile that was used for the Fast Flux Test Facility and support facilities. Liquid and solid waste were not

directly disposed in the 400 Area. The groundwater under the 400 Area has been contaminated as a result of other Site operations.

- The 300 Area waste sites, materials and facilities will be remediated to allow industrial and economic diversification opportunities. The Federal government will retain ownership of land in and adjacent to the 300 and 400 Areas, but will lease land for private and public uses to support regional industrial and economic development. Excess land within the 1100 Area will be targeted for transition to non-Federal ownership.

2.3.4 Central Core

The Central Core Area consists of the approximately 240 square miles of the Site that are not included in one of the other areas. It does not include the Arid Land Ecology Reserve or the North Slope. This area is generally clean, except for the groundwater, which has been contaminated as a result of Site operations in other areas, and some solid waste disposal sites.

- This area will remain in Federal ownership consistent with safety analysis boundaries and waste management operations in the 200 Area. These areas will be available for other Federal programs or leased for non-Federal uses, consistent with appropriate recognition of cultural and ecosystem values.

2.4 MATERIAL CATEGORIES, REQUIREMENTS, AND PLANNING ASSUMPTIONS

The hazard sources on the Hanford Site have been aggregated into four general categories. They are: Nuclear materials, Environmental contamination, Facilities, and Waste (solid and liquid). The following sections provide summary discussions of the hazard sources currently on the Hanford Site and the planning assumptions for establishing cleanup levels and requirements.

2.4.1 Nuclear Materials

Nuclear materials generally consist of discrete packages of separated radionuclides currently stored on-site. These materials include spent nuclear fuels, special nuclear materials, miscellaneous actinides, nuclear standards/sources, lab samples, cesium pellets, tritium and inventories of non-irradiated uranium that are located in a variety of facilities in the 100, 200, 300, and 400 Areas. The material generally represents the most concentrated forms of radionuclides on-site. Combined with the relatively unstable or dispersable chemical form of a portion of the inventory, this material presents one of the primary risks of near-term releases. Storage in facilities that are currently 25 to 50 years old result in maintaining relatively high-cost administrative and physical systems to control the materials to present standards.

- Spent nuclear fuels will be prepared and packaged as necessary for interim, dry storage onsite, and shipped offsite for disposal in a national repository.

2.4.2 Environmental Contamination

Environmental contamination is the result of past discharges (intentional and accidental) of liquid and solid wastes. Contaminants have reached the soil, groundwater, and the Columbia River. Direct discharges of liquid to the soil has been greatly reduced in the past five years.

- Groundwater remains restricted for a yet to be determined period pending decisions on final attainable cleanup levels. Remediation actions will protect the Columbia River and the near-shore environment, reduce contamination entering the groundwater, and control the migration of plumes that threaten groundwater quality beyond the boundaries of the Central Plateau.
- Contaminated soil sites will be treated to levels supportive of future use targets or regulator-specified levels for each geographic area as prescribed by CERCLA/RCRA decisions.

2.4.3 Facilities

The facilities include the nine reactors in the 100 Areas, five fuel re-processing facilities in the 200 Areas, miscellaneous fuel fabrication and hot cell facilities in the 300 Area, and the Fast Flux Test Facility in the 400 Area. The facilities also include the nonnuclear support facilities (e.g., steam plants, maintenance shops, office buildings).

- Safe, stable, secure onsite storage will be provided for all nuclear materials pending decisions on final disposition or until beneficial offsite uses are identified. Facilities without identified future uses will be transitioned to low-cost, stable deactivated conditions (requiring minimal surveillance and maintenance) pending eventual D&D and removal or closure.
- Surplus facilities will be decommissioned and decontaminated sufficiently to enable removal or closure through entombment.

2.4.4 Solid Waste

Solid wastes have been placed in excavated trenches and caissons in the 100, 200, 300, and 600 Areas. Prior to 1970 all waste was disposed on-site in un-lined trenches without being segregated. After 1970 solid wastes were segregated into transuranic and non-transuranic portions. The transuranic wastes were stored in a retrievable manner and the non-transuranic wastes (i.e., low-level radioactive wastes) were disposed in unlined trenches.

Low-level radioactive solid wastes continue to be disposed in shallow trenches on the Hanford Site. Solid waste materials other than low-level radioactive wastes are stored as discrete packages (e.g., 210-Liter drums) in buildings that have been specifically constructed for storage or that have been adapted for storage by retrofitting. The storage facilities are primarily located in the 200 Areas and are generally of recent construction. Additional solid waste will continue to be generated by ongoing Site surveillance and maintenance activities, new cleanup actions, and offsite activities. The solid waste primarily consists of inert materials contaminated with small

quantities of radionuclides, hazardous chemicals, or both. The inert materials that become waste vary across a wide range of inorganic and organic material types (e.g., metals, paper, plastic, cloth, rubber, soil, biological solids, and structural material). The material does not generally represent a large risk to the public due to the low concentration of contaminants; however, when the large mass of waste is combined with the low-contaminant concentration, significant total quantities of radionuclides and hazardous chemicals are estimated to be stored in solid waste.

- Solid wastes will be dispositioned consistent with national policies for management of transuranic, low level, low level mixed and hazardous wastes. Hanford will continue to receive onsite and offsite wastes for disposal in the 200 Area.

2.4.5 Radioactive Tank Waste / Liquid Wastes

Liquid waste is currently stored in the 100 Area K Basins and in the 200 Areas Tank Farms. The liquid waste in the K Basins has leaked to the environment in the past and, under accident conditions, the liquid waste could be released and spread throughout the environment. Liquid waste in the 200 Area Tank Farms has also leaked to the environment in the past, and is likely to leak in the future due to continued deterioration of the tanks. In addition, significant safety issues have been identified for several of the tanks.

Highly radioactive liquid wastes have been stored in large underground storage tanks at Hanford since 1944. Approximately 212,000 cubic meters of waste are currently stored in 177 tanks, including 149 single-shell tanks and 28 double-shell tanks.

The radioactive waste in these tanks has come from various sources: (1) plutonium and uranium recovery processing of approximately 100,000 Mtu of irradiated fuel, (2) radionuclide recovery processing of tank waste, and (3) miscellaneous sources (e.g., laboratories and reactor decontamination solutions). The caustic wastes consist of many different chemicals and waste forms including liquids, slurries, salt cake, and sludge. The waste contains sodium nitrate and nitrite, sodium hydroxide, sodium aluminate, sodium phosphate, large amounts of organic materials, and approximately 190 MCi of various radioactive isotopes (reference, Integrated Database Report, Rev. 13 OakRidge RW-006, December 1997).

The singe-shell tanks, first placed in service in 1944, are reinforced-concrete tanks with carbon steel liners. The single-shell tanks have capacities ranging from 208 cubic meters to 3785 cubic meters. Sixty-seven of the single-shell tanks have leaked or are suspected of leaking approximately 3785 cubic meters to the surrounding soil. Unless the contaminated soils are remediated, they may be a dominant contributor to long-term releases. The pumpable liquids have been removed from many of the single-shell tanks so that the remaining waste is primarily sludge and salt cake.

The double-shell tanks, first placed in service in 1971, consist of a carbon steel primary tank, an annular space, and a secondary steel tank encased in concrete. The double-shell tanks have a nominal capacity of 3785 cubic meters. No evidence exists that any of the double-shell tanks have leaked.

- Tank waste from both SSTs and DSTs will be retrieved for immobilization. Waste will be separated into high-level (HLW) and low-activity (LAW) fractions. LAW will be immobilized and disposed of onsite. HLW will be immobilized for disposal in an offsite federal repository.

2.5 MEASURES OF SUCCESS

This section contains the Critical Success Factors and Success Indicators from the Hanford Strategic Plan.

2.5.1 Critical Success Factors

Protect worker safety and health
- Reduce accidents and radiological exposure
- Achieve Voluntary Protection Program "star" status

Protect public health and the environment
- Reduce or eliminate emissions and effluents
- Regulatory and TPA compliance

Manage Hanford to achieve progress
- Projectize Hanford for clear management accountability, responsibility, and authority
- Establish and control project baselines
- Link key performance measures to results
- Maintain a well-trained and qualified workforce

Optimize the Hanford site infrastructure
- Develop cost-competitive infrastructure commensurate with mission needs
- Involve staff and community in the outsourcing process

Contribute to economic diversification
- Link econmic diversification strategies with all Hanford activities and contractors
- Involve local community and leaders in projects

Build and strengthen partnerships for progress
- Include Tribal Nations, regulators, and stakeholders in planning processes
- Champion the public’s right to know with prompt, accurate information

2.5.2 Success Indicators

Hanford has identified key mission indicators which must be achieved for successful cleanup. They are:
- Reduced risks to the worker, the public, and the environment
- Increased amount of land and other resources recovered for other (private and government) uses
- Reduced/eliminated total amount of inventory and materials remaining to be cleaned up
- Reduced/eliminated costly mortgages (payment for long-term surveillance and maintenance)